

Effect of Back Span Length Ratio to the Deflection of a Propped Beam

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OBJECTIVES

- Determine the effect of the propped beam to back span length ratio in terms of the maximum deflection in the beam
 - Provided three scenarios with various $L1/L2$ ratio, determine the location of its maximum deflection
 - Determine which ratio would be optimal in terms of deflection
 - Determine the allowable maximum deflection and its corresponding allowable load at which location
 - Verify the relationship between maximum deflection and length

APPLICATION



In this experiment, a propped cantilever beam pool application at the Hemeroscopium House located in Madrid is to be analyzed wherein its optimal length ratio ($L1/L2$) is to be determined from the three trials.

RELATED LITERATURE/ THEORY

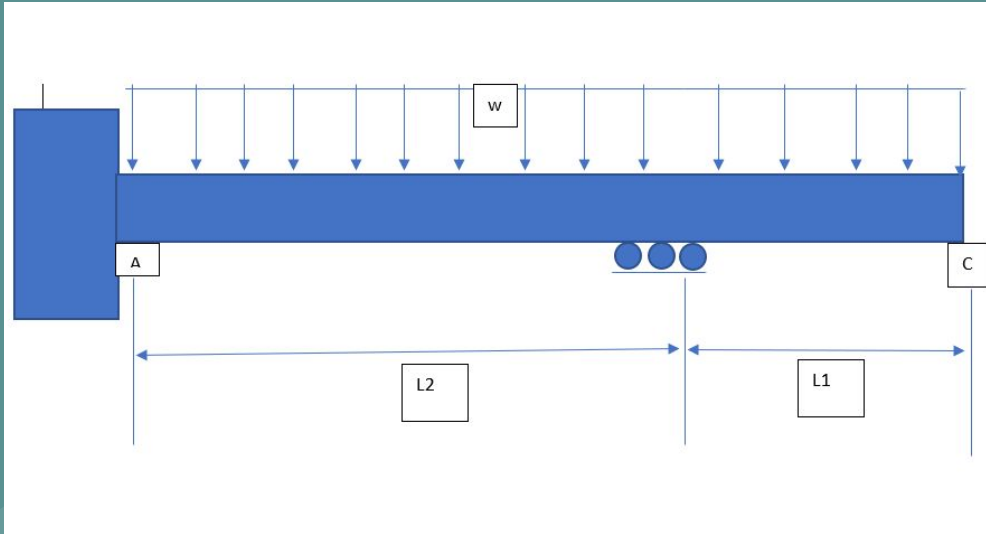
- A negative bending moment—synonymous to the title of a hogging moment—is necessitated to be observed at the location of the prop, specific to the case of a propped cantilever
- The minimum thickness according to the ACI code limitation for a one way slab and beam are $L/24$ and $L/18.5$ respectively.
- When load is applied to non-rigid propped beam, deflection occurs

METHODOLOGY

- Determine the effect of the back span length ratio in terms of the maximum deflection of the beam and determine the optimal length ratio ($L1/L2$) among the three trials.
 - Solve for the reaction forces of the propped beam
 - Solve the allowable maximum deflection
 - Find slope and deflection at B
 - Find slope at C

Experimental Set-up

- Using STR-4, obtain the dimensions of a steel propped beam ($E = 200 \text{ GPa}$) by measuring the length and thickness of the beam at points A-B (L_2) and B-C (L_1)

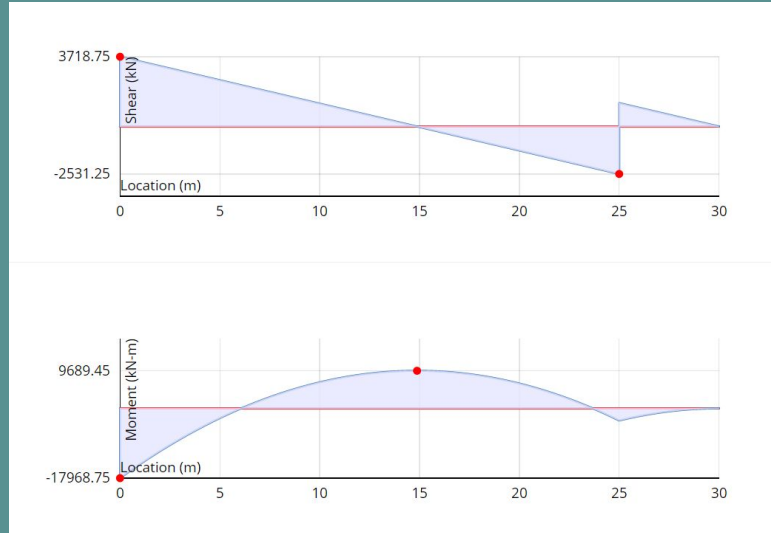


Trial No.	L1 (m)	L2 (m)	w (kN/m)	E (GPa)
1	5	25	250	200
2	10	20	250	200
3	15	15	250	200

METHODOLOGY

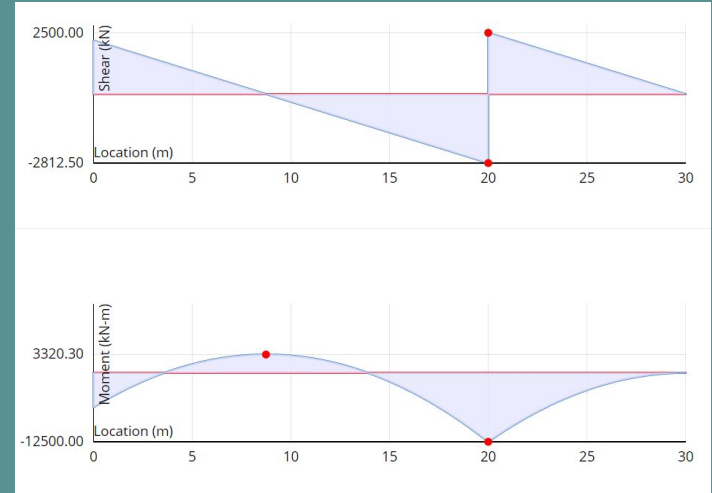
Trial No.	Deflection at point B (m)	Slope at point B (m)	Backspan ratio (L1/L2)
1	-12644.06	4473.96	0.2
2	-12570.00	2420.42	0.5
3	-11871.56	1074.38	1

METHODOLOGY

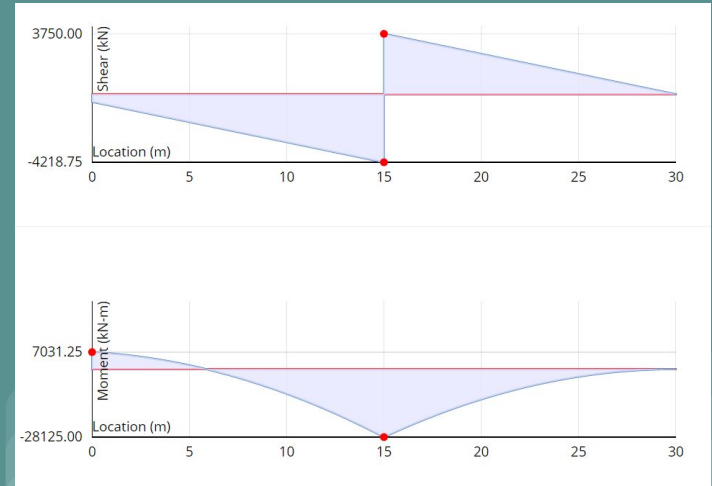


Trial 1

Trial 2



Trial 3



CONCLUSION

- A propped beam is a type of beam that has one fixed end and another **support** in the span of the whole beam; the support is there in order to **resist the deflection** of the beam.
- The computation for the deflection of the beam in the researcher's problem is **all negative**—resulting in a **downward deflection** of the beam regardless of the present propped beam.
- This may happen because of the length of the beam.
- To prevent this from happening there must be **more support in the whole beam** that is made; having more support will **lessen the deflection** of the propped beam

CONCLUSION

- The slope of the beam is also **negative** because of the **failure of the beam with its load and its length.**
- The optimal backspan ratio is in Scenario 3 (Trial 3) wherein $L2 = 15$ m and $L1 = 15$ m.
- As the roller is shifted to the left, the backspan ratio increases.
- As the backspan ratio increases, an inversely proportional relationship with the deflection at point B was observed.



THANK YOU!